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RESEARCH LETTER

Liberation from pediatric continuous kidney replacement therapy: a survey of provider perceptions and practices

Evan A. Rajadhyaksha[1] · Dana Y. Fuhrman[2] · Shina Menon[3] · David T. Selewski[4] · Katja M. Gist[5] · Michelle C. Starr[1,6]

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Introduction

Continuous kidney replacement therapy (CKRT) is commonly used to treat critically ill children. Recent work by the WE-ROCK collaborative reports that longer CKRT duration and lower urine output at CKRT initiation are associated with a lower likelihood of successful liberation from CKRT [1, 2]. However, approaches to CKRT liberation and factors important in this decision-making process are inadequately described. Using a multinational collaborative, we sought to characterize providers' approaches to CKRT liberation.

Methods

An electronic survey was distributed to WE-ROCK collaborative members ($N = 319$) from March to June 2024. Questions evaluated decision-making factors used to determine both a patient's CKRT liberation readiness and success (Supplemental Item 1). Factor importance was rated using a 5-point Likert scale with 4 and 5 representing "moderately" and "very" important. Responses are reported as medians [interquartile range]. Responses were compared between nephrologists and intensivists using Wilcoxon's rank sum or Fisher's exact tests as appropriate (GraphPad, San Diego, CA).

Results

A total of 229 respondents (36% nephrology, 64% intensive care) completed the survey. Most (85%) practiced in the USA, with 11 total countries represented (Table 1). Only 24% of respondents had a standardized approach to CKRT liberation. Of those, 65% used a diuretic bolus, and 57% used a combination of loop and thiazide diuretics. Nephrologists were four times more likely than intensivists to give the diuretic bolus after stopping CKRT versus before or at the time of stopping ($P < 0.001$).

When evaluating readiness for CKRT liberation, nephrologists placed more value than intensivists on spontaneous urine output without diuretics (5 [4, 5] vs. 3 [3, 4], $P < 0.001$), number of vasoactive medications (4, [3, 4] vs. 3 [2, 4], $P < 0.001$), and expected total fluid intake (5 [4, 5] vs. 4 [4, 5], $P < 0.001$). When determining liberation success, nephrologists placed a higher value on spontaneous urine output (5 [4, 5] vs. 4 [3, 5], $P < 0.001$). The highest-rated factor in determining liberation success was urine output in response to diuretics, with 94% of respondents ranking it "moderately" or "very" important, followed by cumulative fluid balance (89%). The highest-rated factors in readiness for liberation were expected fluid intake and cumulative fluid balance (86%) (Fig. 1). Years of practice did not change responses among intensivists; there were not enough nephrologists to assess how years of practice changed responses.

✉ Michelle C. Starr
mcstarr@iu.edu

1 Division of Nephrology, Department of Pediatrics, Indiana University School of Medicine, Indianapolis, IN, USA

2 Division of Nephrology, Department of Pediatrics, UPMC, Pittsburgh, PA, USA

3 Division of Nephrology, Department of Pediatrics, Stanford University, Palo Alto, CA, USA

4 Division of Nephrology, Department of Pediatrics, Medical University of South Carolina, Charleston, SC, USA

5 Section of Hospital Medicine, Department of Pediatrics, University of Colorado Anschutz Medical Campus, Aurora, CO, USA

6 Division of Child Health Service Research, Department of Pediatrics, Indiana University School of Medicine, Indianapolis, IN, USA

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Table 1 Participant-reported demographics and practice settings

Responses, *n* (%)	229
Pediatric specialty (*n* = 235)	
Nephrology	83 (36.2)
Pediatric intensivist	108 (47.2)
Cardiac intensivist	38 (16.6)
Neonatologist	6 (2.6)
Role (*n* = 228)	
Attending	179 (78.2)
Fellow	30 (13.1)
Advanced practice provider	19 (8.3)
Year of practice (*n* = 228)	
1 to 5	101 (44.3)
6 to 10	49 (21.5)
11 to 20	55 (24.1)
> 20	23 (10.1)
CKRT patient days in 2023 (*n* = 47)	
< 100	1 (2.1)
100–500	14 (29.8)
500–750	16 (34.0)
> 750	16 (34.0)
Countries (*n* = 217)	
USA	185 (85.3)
Canada	11 (5.1)
Europe (Austria, Italy, Spain, UK)	14 (6.5)
Asia (Turkey, Japan, Thailand)	5 (2.3)
Australia	1 (0.5)
South America (Ecuador)	1 (0.5)

Discussion

We found that nephrologists and intensivists generally agree on factors important for decision-making in CKRT liberation. Few providers have a standard approach, a finding that echoes current literature [3]. Fluid balance emerged as the top consideration in determining readiness for CKRT liberation. While respondents placed high value on urine output, there remains a lack of standardized output thresholds to guide CKRT liberation decisions. This likely contributes to variability in the design and interpretation of CKRT liberation studies [3–5].

A strength of this survey is the diversity of participant specialties and levels of training, capturing many types of providers who make decisions in pediatric CKRT. The distribution method through WE-ROCK providers and colleagues may have introduced a sampling bias toward those at large academic centers, and it limits our ability to determine a response rate. Future research should focus on integrating these existing practice patterns with CKRT liberation data to define objective markers and clinically relevant thresholds.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s00467-025-06849-4.

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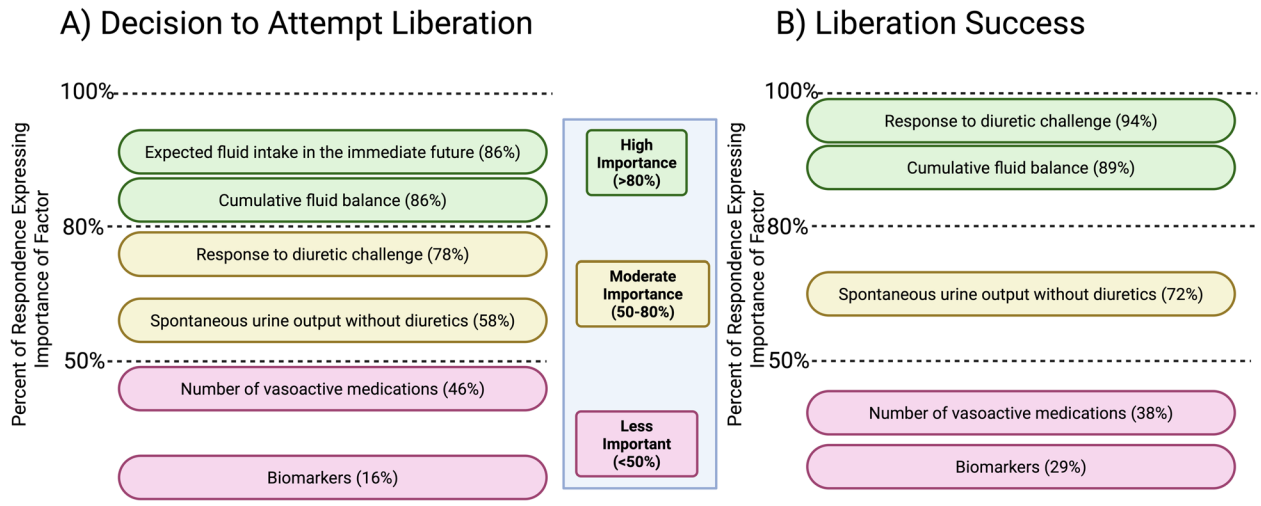

Fig. 1 Clinical decision-making factors valued by respondents for decision to attempt liberation from CKRT (**A**) and liberation success from CKRT (**B**). Representation of clinical decision-making factors ranked with moderate or high importance (Likert 4 or 5) by respondents, with percentage displayed in parenthesis and grouped into high importance (> 80%), moderate importance (50–80%), and less important (< 50%)

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Author contribution ER and MS conceptualized and designed the study, assisted with data analysis and interpretation, drafted the initial manuscript, and reviewed and revised the manuscript. SM and KG conceptualized and designed the study, provided support and mentorship, and reviewed and revised the manuscript. DF and DS assisted with the design of the study, data interpretation, and reviewed and revised the manuscript for important intellectual content. All authors approve the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Data availability De-identified summary data are available through the WE-ROCK collaborative. The statistical analysis plan will be made available upon request. The survey instrument is available upon request.

Declarations

Competing interests All authors declare no real or perceived conflicts of interest that could affect the study design, collection, analysis, or interpretation of data, writing of the report, or the decision to submit for publication. For full disclosure, we provide here an additional list of other author commitments and funding sources that are not directly related to this study: Evan Rajadhyaksha receives funding from the National Institutes of Health (NIGMS). Dana Fuhrman gets funding from the National Institutes of Health (NIDDK). Shina Menon is a consultant for Medtronic, Inc., and Nuwellis, Inc., and receives funding from the Gerber Foundation. Katja M. Gist is a consultant for Bioporto Diagnostics and Potrero Medical and receives funding from the Gerber Foundation. Michelle C. Starr gets funding from the National Institutes of Health (NIDDK and NHLBI).

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Prior presentation of study data An earlier analysis of these data was presented in abstract form at the Pediatric Academic Societies Annual Meeting.